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# FOREST PEST MANAGEMENT

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3420 BIOLOGICAL EVALUATION

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Disease Survey of Buckhorn Creek
Lodgepole Pine Stand
Estes-Poudre Ranger District
Arapaho and Roosevelt National Forests

1985


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## INTRODUCTION

Armillaria root disease in naturally-regenerated lodgepole pine was surveyed beginning in 1959 in a 25-acre stand clearcut in about 1947 on Buckhorn Creek (T.7N., R.72W., S.20 and 29), Estes-Poudre Ranger District, Arapaho and Roosevelt National Forests. Permanent plots were established in 1959 and monitored annually for five years by Dr. Frank G. Hawksworth, Rocky Mountain Forest and Range Experiment Station. The stand was thinned in 1964, and then re-examined in 1977 by Johnson and Hawksworth prior to a second thinning (Johnson and Hawksworth, 1977). The final disease survey was performed in 1985 by Diane M. Hildebrand (Plant Pathologist) and James A. Kempert (Biological Technician).

Armillaria mellea causes shoestring root rot, the most common forest root disease in the Rocky Mountain Region. This root disease can kill all commercially important conifer and hardwood tree species in the Region. Although the disease tends to act as a natural thinning agent, localized heavy mortality can cause serious problems in recently cut or thinned stands, and plantations (Johnson, 1985).

## PREVIOUS SURVEYS AND METHODS

In 1959, the stand survey included 0.01 acre plots located at one chain intervals along transects which were ten chains apart. Sixty-three permanent plots were established in root disease centers and monitored annually for five years. Annual losses to A. mellea were nearly 2 percent in 1960, but steadily declined to 0.4 percent by 1964. Table 1 summarizes the Armillaria root-disease losses as reported by Johnson and Hawksworth (1977).

Table 1. Annual and cumulative mortality of lodgepole pine due to Armillaria root disease near Buckhorn Creek, Arapaho and Roosevelt National Forests from 1959 to 1964.

| Year | Annual Mortality (%) | Cumulative Loss (%) |
|---|---|---|
| 1959 | --- | 6.4 |
| 1960 | 1.9 | 8.3 |
| 1961 | 1.3 | 9.6 |
| 1962 | 0.8 | 10.4 |
| 1963 | 0.8 | 11.2 |
| 1964 | 0.4 | 11.6 |

In 1977, root-disease losses in the stand were again surveyed using 84, 0.01 acre plots located at one chain intervals along transects ten chains apart. All trees over three feet tall were tallied for health, and dead trees were examined for symptoms of Armillaria root disease. In 25 percent of the plots, the height and diameter of the tree nearest plot center was recorded.

In 1977, the stand was about 30 years old with average diameter of 4.3 inches and height of 23 feet. Of the 1292 trees per acre, 98 trees/acre were killed by A. mellea. All of the dead trees examined were suppressed, non-crop trees.

In 1985, a final survey of the stand was conducted using the same methods as before, with 67 plots tallied.

## 1985 RESULTS

A total of 514 trees were tallied in the 67 plots in 1985, yielding 415 lodgepole pine, 3 aspen, 12 Engelmann spruce, and 9 subalpine fir live trees per acre. Most of the mortality observed was in aspen, which suffered much elk-barking, cankers, and suppression but very little Armillaria root disease. The aspen were present in clumps in the stand. In lodgepole pine, 10 trees per acre were killed by Armillaria root disease, but all of these were suppressed, non-crop trees. The lodgepole pine had an average diameter of 5.5 inches and average height of 33 feet.

Western gall rust, Endocronartium harknesssii, has invaded the stand and large galls in the main bole of crop-size trees were observed in 39 trees per acre. Branch galls were tallied on an additional 19 crop-size trees per acre. Stalactiform rust, Cronartium stalactiforme, and lodgepole pine dwarf mistletoe, Arceuthobium americanum, are present at low levels in the stand, but are not yet causing significant losses.

## SUMMARY

Armillaria root disease is no longer causing significant losses in the Buckhorn Creek lodgepole pine stand. Other insignificant diseases in the stand include stalactiform rust and dwarf mistletoe. These diseases may increase in the future. Western gall rust is currently causing cull in 39 trees per acre and will continue to increase, due to sufficient sources of inoculum in branch and bole galls throughout the stand. The Buckhorn Creek lodgepole pine stand is currently stocked at 376 healthy trees per acre with some regeneration of lodgepole, spruce, and fir, and pockets of aspen. In time, increased western gall rust will contribute to bole breakage which will create small openings for regeneration. If the stand is allowed to grow to 90 years rotation age, a multi-storied stand will probably result.

## REFERENCES

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